

## EAST Search History

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S27 1	1203	713/176.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 2	367	713/165.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 3	282	713/167.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 4	444	713/170.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 5	409	726/26.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 6	276	726/27.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 7	180	726/28.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 8	143	726/29.ccls.	USPAT	OR	ON	2007/06/13 14:07
S27 9	183	726/30.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 0	71	726/31.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 1	77	726/32.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 2	77	726/32.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 3	52	726/33.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 4	194	380/200.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 5	553	380/201.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 6	166	380/202.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 7	274	380/203.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 8	400	380/54.ccls.	USPAT	OR	ON	2007/06/13 14:08
S28 9	180	380/55.ccls.	USPAT	OR	ON	2007/06/13 14:08
S29 0	752	705/51.ccls.	USPAT	OR	ON	2007/06/13 14:08
S29 1	562	705/57.ccls.	USPAT	OR	ON	2007/06/13 14:09

## EAST Search History

S29 2	207	705/58.ccls.	USPAT	OR	ON	2007/06/13 14:09
S29 3	360	705/59.ccls.	USPAT	OR	ON	2007/06/13 14:09
S29 4	863	709/200.ccls.	USPAT	OR	ON	2007/06/13 14:09
S29 5	3200	709/217.ccls.	USPAT	OR	ON	2007/06/13 14:09
S29 6	909	(audio or music or sound or mp3) near4 (ID or identification or password or PIN) near6 (extract\$4 or read\$4 or recorg\$7 or discern\$6)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S29 7	76	(audio or music or sound or mp3) near4 (ID or identification or password or PIN) near6 (extract\$4 or read\$4 or recorg\$7 or discern\$6) and (watermark\$4 or steganograph\$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:24
S29 8	4	S296 and S271	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:16
S29 9	2	S296 and S272	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:16
S30 0	0	S296 and S273	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:16
S30 1	2	S296 and S274	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 2	1	S296 and S275	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 3	1	S296 and S275	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17

## EAST Search History

S30 4	1	S296 and S276	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 5	0	S296 and S277	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 6	0	S296 and S278	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 7	0	S296 and S279	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 8	27	S296 and S295	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:17
S30 9	777	(audio or music or sound or mp3) near4 (ID or identification or password or PIN) and (plural\$6 or multiple or many) near4 bit	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:21
S31 0	0	(plural and bit and ID and portion and (audio or sound or music or song or mp3) and discern\$4).CLM.	US-PGPUB; USPAT	OR	ON	2007/06/13 14:22
S31 1	772	(audio or music or sound or mp3) near4 (ID or identification or password or PIN) and (watermark\$4 or steganograph\$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:25
S31 2	814	(audio or music or sound or mp3 or song) near4 (ID or identification or password or PIN) and (watermark\$4 or steganograph\$4)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:25
S31 3	230	(audio or music or sound or mp3 or song) near4 (ID or identification or password or PIN) and (watermark\$4 or steganograph\$4) and (plural\$6 or multiple or many) near4 (bit)	US-PGPUB; USPAT; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2007/06/13 14:28

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audio and watermark

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Web

Results 1 - 10 of about 1,300,000 for **audio and watermark**. (0.18 seconds)**Activated Content Digital Audio Watermarking**

At the core of each of its products is the ActivatedAudio™ **Watermark**, a proprietary, "Golden Ear" approved, and field proven **audio watermark**. ...

[www.activatedcontent.com/](http://www.activatedcontent.com/) - 19k - [Cached](#) - [Similar pages](#)

**audio watermark Definition**

**audio watermark** Definition. ... A **watermark** embedded within an **audio** stream to identify its origination. See digital **watermark**. RELATED TERMS: ...

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**Public Audio Watermark Homepage**

In this paper, we present a novel approach for embedding a digital **watermark** inaudibly into an **audio** clip, in the time domain, according to the difference ...

[www.cmlab.csie.ntu.edu.tw/~dynamic/AWM/index.html](http://www.cmlab.csie.ntu.edu.tw/~dynamic/AWM/index.html) - 27k - [Cached](#) - [Similar pages](#)

**[PDF] Audio Digital watermark Algorithm Based M-Sequence Modulation**

File Format: PDF/Adobe Acrobat

**watermark**. technology. The. most. inpom cllaracterisiic of **audio** ... **watermark**. information. in. dle. smple data of **audio** signal wide. transform. donlain ...

[ieeexplore.ieee.org/iel5/9834/30995/01442264.pdf](http://ieeexplore.ieee.org/iel5/9834/30995/01442264.pdf) - [Similar pages](#)

Welcome to IEEE Xplore 2.0: Anti-cropping synchronization **audio** ...

Anti-cropping synchronization **audio** digital **watermark** algorithm based on

**watermark** sequence number Hongwang Yi Sun Ling Lu Wenbing Shu ...

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**Barnes & Noble.com - Audio Player: Watermark [Bonus Track] Enya CD**

Barnes & Noble.com. Product Information Cover Image. **Watermark** [Bonus Track]

Enya. Price: \$18.99 Member Price: \$17.09. Product Details. Track List. Disk 1. ...

[music.barnesandnoble.com/search/mediaplayer.asp?](http://music.barnesandnoble.com/search/mediaplayer.asp?ean=075992677424&disc=1&track=6)

[ean=075992677424&disc=1&track=6](http://music.barnesandnoble.com/search/mediaplayer.asp?ean=075992677424&disc=1&track=6) - 11k - [Cached](#) - [Similar pages](#)

**Watermark Embedding for Audio Signals**

The objective of developing the **audio watermark** technique was to ensure that the **watermark** does not become unusable until intentional or inadvertent ...

[www.musictrace.de/products/contentmark.en.htm](http://www.musictrace.de/products/contentmark.en.htm) - 19k - [Cached](#) - [Similar pages](#)

**SysCoP - audio**

Consequently the definition of robustness of the **watermark** depends on the quality of the watermarked **audio** track. A **watermark** is robust if it's removed from ...

[www.igd.fraunhofer.de/igd-a8/syscop/audio.html](http://www.igd.fraunhofer.de/igd-a8/syscop/audio.html) - 11k - [Cached](#) - [Similar pages](#)

**New audio "watermark" copy protection scheme for cinemas in the ...**

Well not for long... the movie industry just unveiled a system at their DVD Forum in Paris last week that would embed an **audio "watermark"** during the ...

[www.engadget.com/2005/11/02/new-audio-watermark-copy-protection-scheme-for-cinemas-in-the/](http://www.engadget.com/2005/11/02/new-audio-watermark-copy-protection-scheme-for-cinemas-in-the/) - 108k - Jun 12, 2007 - [Cached](#) - [Similar pages](#)

**Audio: 03 Watermark - I'll drown the urge for permanence and certainty**

The Weakerthans. Dec 21, 2006 at 11:32 AM. 03 **Watermark** ... You will be asked to join Vox to post this comment. « Previous · **Audio** · Next » ...

[asdfghjkl.vox.com/library/audio/6a00c2252b48d9604a00cdf7ee8817094f.html](http://asdfghjkl.vox.com/library/audio/6a00c2252b48d9604a00cdf7ee8817094f.html) - 64k - [Cached](#) - [Similar pages](#)

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Web

Results 1 - 10 of about 1,010,000 for **audio and steganography**. (0.15 seconds)**Steganography**

In this article, I will discuss what **steganography** is, what purposes it serves, .... And we haven't even discussed hidden data inside **audio** files! ...

[www.garykessler.net/library/steganography.html](http://www.garykessler.net/library/steganography.html) - 20k - [Cached](#) - [Similar pages](#)

**audio steg. overview**

This section provides a brief overview of the basic principles of **steganography** and digital **audio**. It then introduces **audio steganography**, allowing the ...

[www.snotmonkey.com/work/school/405/overview.html](http://www.snotmonkey.com/work/school/405/overview.html) - 11k - [Cached](#) - [Similar pages](#)

**[PDF] AUDIO STEGANOGRAPHY FOR COVERT DATA TRANSMISSION BY IMPERCEPTIBLE ...**

File Format: PDF/Adobe Acrobat - [View as HTML](#)

Keywords: **Audio Steganography**, Imperceptible tone, insertion, 1. INTRODUCTION. Covert communication by embedding a message or data ...

[www.calumet.purdue.edu/engr/docs/GopalanKali\\_422\\_049.pdf](http://www.calumet.purdue.edu/engr/docs/GopalanKali_422_049.pdf) - [Similar pages](#)

**mp3stego**

8hz-mp3 0.2b – 8Hz implementation of MP3 encoder;; MP3 Decoder (dist10) of the ISO MPEG **Audio** Subgroup Software Simulation Group;; ZLib 1.1.4 compression ...

[www.petitcolas.net/fabien/steganography/mp3stego/](http://www.petitcolas.net/fabien/steganography/mp3stego/) - 15k - [Cached](#) - [Similar pages](#)

**[Paper] Audio Steganography for Covert Data Transmission by ...**

**AUDIO STEGANOGRAPHY FOR COVERT DATA TRANSMISSION BY IMPERCEPTIBLE TONE INSERTION** Kaliappan Gopalan1 and Stanley Wenndt2  
Department of Engineering, ...

[www.actapress.com/PDFViewer.aspx?paperId=16742](http://www.actapress.com/PDFViewer.aspx?paperId=16742) - [Similar pages](#)

**Steganography VIII - Hiding Data in Wave Audio Files - The Code ...**

**Steganography VIII - Hiding Data in Wave Audio Files**. By Corinna John. How to hide data of any kind inside a sound. C# Windows, .NET (.NET 1.0, .NET 1.1) ...

[www.codeproject.com/csharp/steganodotnet8.asp](http://www.codeproject.com/csharp/steganodotnet8.asp) - 58k - [Cached](#) - [Similar pages](#)

**Cryptology I Audio File Steganography**

**Audio steganography** is similar to the process of modifying the Least Significant Bit of image files. By modifying the LSB of several bits of an **audio** file, ...

[library.thinkquest.org/27993/crypto/steg/mod3.shtml](http://library.thinkquest.org/27993/crypto/steg/mod3.shtml) - 6k - [Cached](#) - [Similar pages](#)

**[PDF] Increasing robustness of LSB audio steganography using a novel ...**

File Format: PDF/Adobe Acrobat

One interesting **audio steganography** application is transmission of so-called meta data along with multimedia. Meta data embedded in an **audio** clip ...

[ieeexplore.ieee.org/iel5/9035/28683/01286709.pdf](http://ieeexplore.ieee.org/iel5/9035/28683/01286709.pdf) - [Similar pages](#)

**Nedeljko Cvejic, Algorithms for audio watermarking and ...**

The main challenge in digital **audio watermarking** and **steganography** is that if the perceptual transparency parameter is fixed, the design of a watermark ...

[herkules.oulu.fi/isbn9514273842/](http://herkules.oulu.fi/isbn9514273842/) - [Similar pages](#)

**[PDF] Increasing Robustness of LSB Audio Steganography by Reduced ...**

File Format: PDF/Adobe Acrobat - [View as HTML](#)

perceptual quality of watermarked **audio** is higher in the case of the proposed method than in the standard LSB method. Key Words: **audio steganography**, ...

[www.mediateam.oulu.fi/publications/pdf/618.pdf](http://www.mediateam.oulu.fi/publications/pdf/618.pdf) - [Similar pages](#)

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audio and watermark



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### 1 [Benchmarking and attacks: Transparency and complexity benchmarking of audio watermarking algorithms issues](#)



Andreas Lang, Jana Dittmann

September 2006

**Proceeding of the 8th workshop on Multimedia and security MM&Sec '06**

Publisher: ACM Press

Full text available: pdf(336.26 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A wide range of watermarking evaluation techniques especially for robustness has been described in the literature. Our paper sets the main focus on the evaluation of transparency and complexity of the embedding function of digital audio watermarking algorithms. Here, beside the evaluation of embedding parameters and the impact of audio content are investigated to determine the effects of transparency and complexity. The five selected watermarking algorithms, working in different domains, the emb ...

**Keywords:** audio, benchmarking, evaluation, watermarking

### 2 [Digital watermarking approaches I: A compressed-domain watermarking algorithm for mpeg audio layer 3](#)



D. K. Koukopoulos, Y. C. Stamatiou

October 2001

**Proceedings of the 2001 workshop on Multimedia and security: new challenges MM&Sec '01**

Publisher: ACM Press

Full text available: pdf(483.56 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

In this work, we present a digital watermarking scheme for mpeg audio layer 3 audio files that operates directly in the compressed data while manipulating the time and subband/channel domain. In addition, it does not need the original signal to detect the watermark. Our scheme overcomes the disadvantage of algorithms operating in the PCM-Data domain to be vulnerable to compression/recompression attacks, as it places the watermark in the scale factors domain and not in the digitized sound audi ...

**Keywords:** NP-completeness, audio watermarking, hard instances, mpeg audio layer 3, threshold phenomena

### 3 [Posters and Short Papers: Digital audio watermarking based-on multiple-bit hopping and human auditory system](#)



Changsheng Xu, Yongwei Zhu, David Dagan Feng

October 2001

**Proceedings of the ninth ACM international conference on Multimedia MULTIMEDIA '01**

Publisher: ACM Press

Full text available: pdf(613.16 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A novel content-adaptive audio watermarking technique is proposed. To optimally balance in-audibility and robustness when embedding and extracting watermarks, the embedding scheme is high related to audio content by making use of the properties of human

auditory system and multiple-bit hopping technique. The experimental results in robustness are provided to support all the novel features in our watermarking scheme.

**Keywords:** audio, digital watermarking, human auditory system

#### 4 Audio: An SVD-based audio watermarking technique



Hamza Özer, Bülent Sankur, Nasir Memon

August 2005

**Proceedings of the 7th workshop on Multimedia and security MM&Sec '05**

Publisher: ACM Press

Full text available: pdf(283.33 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

We present a non-oblivious, extremely robust watermarking scheme for audio signals. The watermarking algorithm is based on the SVD of the spectrogram of the signal. The SVD of the spectrogram is modified adaptively according to the information to be watermarked. The algorithm is tested for inaudibility performance with audio quality measures and robustness tests with audio Stirmark benchmark tool, which have a variety of common signal processing distortions. The comparison with a DCT based non-o ...

**Keywords:** singular value decomposition, watermarking

#### 5 Audio: Audio watermark attacks: from single to profile attacks



Andreas Lang, Jana Dittmann, Ryan Spring, Claus Vielhauer

August 2005 **Proceedings of the 7th workshop on Multimedia and security MM&Sec '05**

Publisher: ACM Press

Full text available: pdf(224.98 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A wide range of watermarking evaluation approaches and especially image benchmarking suites have been described in the literature. Our paper sets the main focus on the evaluation of digital audio watermarking with StirMark Benchmark for Audio (SMBA). Here we describe the currently implemented single geometric attacks in detail and introduce our so-called attack profiles. Profiles reflect an application oriented point of view ranging from the normal usage of audio content like internet radio or m ...

**Keywords:** attack, audio, digital watermarking, smba, stirmark

#### 6 Biometrics, watermarking, IKE: A new content-based digital audio watermarking algorithm for copyright protection



Xiang-yang Wang, Yong-rui Cui, Hong-ying Yang, Hong Zhao

November 2004

**Proceedings of the 3rd international conference on Information security InfoSecu '04**

Publisher: ACM Press

Full text available: pdf(563.54 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Digital audio watermarking embeds inaudible information into digital audio data for the purposes of copyright protection, ownership verification, convert communication, and/or auxiliary data carrying. In this paper, we present a novel watermarking scheme to embed a meaningful gray image into digital audio by quantizing the wavelet coefficients (using integer lifting wavelet transform) of audio samples. Our audio-dependent watermarking procedure directly exploits temporal and frequency perceptual ...

**Keywords:** digital audio, digital watermarking, human auditory system, integer lifting wavelet transform, quantization

#### 7 Robust digital watermarking: An audio watermarking scheme robust against stereo attacks



David Megías, J. Herrera-Joancomartí, Julià Minguillón

September 2004

**Proceedings of the 2004 workshop on Multimedia and security MM&Sec '04**

Publisher: ACM Press

Full text available: pdf(191.73 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, a watermarking scheme for both monophonic and stereophonic audio files is presented. The suggested method uses MPEG 1 Layer 3 compression to determine where

and how the embedded mark must be introduced, combined with an error correcting code and a majority voting scheme. The scheme is shown to achieve high robustness against malicious attacks while maintaining a reasonable imperceptibility. The mark is embedded by modifying the magnitude of the spectrum at certain frequencies which ...

**Keywords:** audio watermarking, copyright protection, frequency domain methods

8 Watermarking algorithms: Informed detection of audio watermark for resolving playback speed modifications



Sylvain Beauget, Michiel van der Veen, Aweke Lemma

September 2004 **Proceedings of the 2004 workshop on Multimedia and security MM&Sec '04**

**Publisher:** ACM Press

Full text available: pdf(388.24 KB)

Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper, we present a method for informed watermark detection in audio signals. In this context, informed detection refers to the mechanism in which the original media signal is used to improve robustness and/or complexity. Here, we focused on reducing complexity by addressing the geometrical distortion problem. In audio, geometrical distortion translates to time scaling. Generally, speed changes of the audio signals necessitate a mechanism in the detector to retrieve the watermark. Usua ...

**Keywords:** audio, fingerprinting, informed detector, music distribution, watermarking

9 Watermarking: Statistical audio watermarking algorithm based on perceptual analysis



Xiaomei Quan, Hongbin Zhang

November 2005 **Proceedings of the 5th ACM workshop on Digital rights management DRM '05**

**Publisher:** ACM Press

Full text available: pdf(261.76 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we describe a novel statistical audio watermarking scheme. Under the control of the masking thresholds, watermark is embedded adaptively and transparently in the perceptual significant portions in wavelet packet domain by a statistical method. Watermark detection can be done without access to the original signal. Experimental results show the proposed scheme can survive common signal manipulations and malicious attacks.

**Keywords:** audio watermarking, psychoacoustic model, wavelet packet decomposition

10 Audio watermarking for monitoring and copy protection



Jaap Haitsma, Michiel van der Veen, Ton Kalker, Fons Bruekers

November 2000 **Proceedings of the 2000 ACM workshops on Multimedia MULTIMEDIA '00**

**Publisher:** ACM Press

Full text available: pdf(313.49 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Based on existing technology used in image and video watermarking, we have developed a robust audio watermarking technique. The embedding algorithm operates in frequency domain, where the magnitudes of the Fourier coefficients are slightly modified. In the temporal domain, an additional scale parameter and gain function are necessary to refine the watermark and achieve perceptual transparency. Watermark detection relies on the Symmetrical Phase Only Matched Filtering (SPOMF) cross-correlation ...

**Keywords:** audio, broadcast monitoring, copy protection, watermark detection, watermark embedding

11 Applications I: PlataJanus: an audio annotation watermarking framework



Jana Dittmann, Martin Steinebach

October 2001 **Proceedings of the 2001 workshop on Multimedia and security: new challenges MM&Sec '01**

**Publisher:** ACM Press

Full text available: pdf(545.27 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The focus of audio watermarking research in recent years have been copyright protection


and copy control mechanisms. Therefore the robustness and security of audio watermarks have been the most frequently discussed parameters. Transparency, payload and complexity have also been important, but most research has focused on the first two parameters. In this paper, we introduce an alternative watermarking application. PlataJanus is a system for displaying and reacting on digital annotation waterm ...

**Keywords:** annotation, audio watermarking, business models, framework

12 Applications I: Estimation of recording location using audio watermarking

 Yuta Nakashima, Ryuki Tachibana, Masafumi Nishimura, Noboru Babaguchi  
September 2006 **Proceeding of the 8th workshop on Multimedia and security MM&Sec '06**

**Publisher:** ACM Press

Full text available:  pdf(209.98 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


In this paper, we propose a novel application of audio watermarking, estimation of recording location. The purpose of the paper is to determine the seat location in a theater at which a bootleg recording was made by using a digital video camera. In the proposed application, we embed different watermarks in the channels of the multi-channel sound of the movie. The multi-channel sound enters the air from multiple loudspeakers in a theater. If a monaural recording of the sound is made, the location ...

**Keywords:** bootleg, digital audio watermarking, estimation, recording location

13 Authentication II: Audio watermarking algorithm for real-time speech integrity and authentication

 Song Yuan, Sorin A. Huss  
September 2004 **Proceedings of the 2004 workshop on Multimedia and security MM&Sec '04**

**Publisher:** ACM Press


Full text available:  pdf(259.52 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Data integrity and source origin authentication are essential topics for real-time multimedia systems. But traditional method, such as MAC, is not very applicable to overcome the distortion introduced in real-time multimedia communication. In this paper a new integrity mechanics deploying speech watermarking is presented. The advocated approach adopts public key encryption to efficiently generate non-repudiate speech. In the last part of the article, a speech watermarking algorithm incorporating ...

**Keywords:** integrity and source origin authentication, real-time multimedia communication and internet telephony, speech watermarking

14 Watermarking: Improved watermark detection for spread-spectrum based watermarking using independent component analysis

 Hafiz Malik, Ashfaq Khokhar, Rashid Ansari  
November 2005 **Proceedings of the 5th ACM workshop on Digital rights management DRM '05**

**Publisher:** ACM Press

Full text available:  pdf(434.70 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper presents an efficient blind watermark detection/decoding scheme for spread spectrum (SS) based watermarking, exploiting the fact that in SS-based embedding schemes the embedded watermark and the host signal are mutually independent and obey non-Gaussian distribution. The proposed scheme employs the theory of independent component analysis (ICA) and posed the watermark detection as a blind source separation problem. The proposed ICA-based blind detection/decoding scheme has been simula ...

**Keywords:** blind source separation, correlation, detection, independent component analysis, spread spectrum, watermarking

15 Content-adaptive digital music watermarking based on music structure analysis

 Changsheng Xu, Namunu C. Maddage, Xi Shao, Qi Tian  
February 2007 **ACM Transactions on Multimedia Computing, Communications, and Applications (TOMCCAP)**, Volume 3 Issue 1

Publisher: ACM Press

Full text available:  [pdf\(583.99 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A novel content-adaptive music watermarking technique is proposed in this article. To optimally balance inaudibility and robustness when embedding and extracting watermarks, the embedding scheme is highly related to the music structure and human auditory system (HAS). A note-based segmentation method is proposed and used for music vocal/instrumental boundary detection. A multiple bit hopping and hiding scheme with different embedding parameters is applied to vocal and instrumental frames of the ...

**Keywords:** Content-adaptive, digital watermarking, inaudibility, music structure, note-based segmentation, robustness

16 Poster 3: content track: Light weight MP3 watermarking method for mobile terminals



Koichi Takagi, Shigeyuki Sakazawa

November 2005

**Proceedings of the 13th annual ACM international conference on Multimedia MULTIMEDIA '05**

Publisher: ACM Press

Full text available:  [pdf\(117.39 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper proposes an MP3 watermarking method that is applicable to a mobile terminal with limited computational resources. Considering that the embedded information is copyright information and metadata, which should be extracted before playing back, the watermark detection process should be executed quickly. However, conventional methods cannot detect a digital watermark at high speed. Thus, this paper proposes that scalefactor values in MP3 data be altered so as not to spoil audio quality. E ...

**Keywords:** MP3, mobile terminal, scalefactor, watermarking

17 Robust digital watermarking: The digital watermarking container: secure and efficient embedding



Martin Steinebach, Sascha Zmudzinski, Fan Chen

September 2004

**Proceedings of the 2004 workshop on Multimedia and security MM&Sec '04**

Publisher: ACM Press

Full text available:  [pdf\(357.96 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

While acceptance of digital watermarking as a technology to protect digital media is constantly increasing, integrated applications are still comparatively rare. Two reasons are the challenge of secure key handling due to the symmetric nature of digital watermarking and the often high demand regarding computational power to embed a watermarking into a media file. We introduce a possible solution to this problem, the digital watermarking container. It splits the watermarking process in a preproce ...

**Keywords:** complexity, container, optimization, security, watermarking

18 Session S1: VR modeling: geometry and texture: A novel watermarking method based on Fibonacci numbers



Jiancheng Zou, Dongxu Qi, Rabab K. Ward

June 2006

**Proceedings of the 2006 ACM international conference on Virtual reality continuum and its applications VRCIA '06**

Publisher: ACM Press

Full text available:  [pdf\(125.56 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A digital image scrambling method based on the Fibonacci numbers is presented in [Zou J. et al. 2004]. A novel audio watermarking method based on Fibonacci numbers is given in this paper. The experiment results show that the algorithm has better robust than the traditional phase watermark algorithm. Based on the property of uniformity of the corresponding Fibonacci transformation, the watermarking method has the following advantages: (1) Encoding and decoding are very simple and they can be appl ...

**Keywords:** fibonacci numbers, watermarking

19 Multimedia issues in digital libraries: A quantified fidelity criterion for parameter-embedded watermarking of audio archives

A. R. Gurijala, J. R. Deller

May 2003 **Proceedings of the 3rd ACM/IEEE-CS joint conference on Digital libraries JCDL '03**

Publisher: IEEE Computer Society

Full text available:  pdf(203.18 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)


A novel algorithm for speech watermarking through parametric modeling is enhanced by inclusion of a quantified fidelity criterion. Watermarking is effected through solution of a set-membership filtering (SMF) problem, subject to an  $l_\infty$  fidelity criterion in the signal space. The SMF approach provides flexibility in obtaining watermark solutions that trade-off watermark robustness and stegosignal fidelity.

20 Security analysis II: Digital watermarking security considerations

Rade Petrovic, Babak Tehrani, Joseph M. Winograd

September 2006 **Proceeding of the 8th workshop on Multimedia and security MM&Sec '06**

Publisher: ACM Press

Full text available:  pdf(253.62 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we review our past experience with security of copy control audio watermarks, particularly related to SDMI. We also classify and analyze attacks published in literature and propose a number of security enhancement techniques for copy control and other digital watermarking applications. One type of security measure is based on uncoordinated selection of hiding places between embedders and extractors, with statistical analysis of expected matches. This approach reduces the repeatability ...

**Keywords:** SDMI, copy control, digital rights management, digital watermarking, watermark attacks

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audio and watermark



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## 21 [Technical session 10: watermarking and multi-media processing: Fingerprinting and forensic analysis of multimedia](#)

Daniel Schonberg, Darko Kirovski

October 2004

**Proceedings of the 12th annual ACM international conference on Multimedia MULTIMEDIA '04**

Publisher: ACM Press

Full text available: pdf(1.24 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

One of the prime reasons movie and music studios have ignored the Internet for open-networked multimedia content delivery, has been the lack of a technology that can support a secure digital rights management (DRM) system on a general purpose computer. The difficulty of building an effective multimedia DRM stems from the fact that traditional cryptographic primitives such as encryption or scrambling do not protect audio or video signals once they are played in plain-text. This fact, commonly re ...

**Keywords:** audio, collusion attack, fingerprinting, forensic analysis, video

## 22 [Preserving, securing, and assessing digital libraries: Why watermark?: the copyright need for an engineering solution](#)

Michael Seadle, J. R. Deller, Aparna Gurijala

July 2002

**Proceedings of the 2nd ACM/IEEE-CS joint conference on Digital libraries JCDL '02**

Publisher: ACM Press

Full text available: pdf(142.88 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

An important research component in the creation of the National Gallery of the Spoken Word (NGSW) is the development of watermarking technologies for the audio library. In this paper we argue that audio watermarking is a particularly desirable means of intellectual property protection. There is evidence that the courts consider watermarks to be a legitimate form of copyright protection. Watermarking facilitates redress, and represents a form of copyright protection that universities can use with ...

**Keywords:** DMCA, copyright, watermarking

## 23 [Biometrics, watermarking, IKE: Component-based digital watermarking of Chinese texts](#)

Xingming Sun, Gang Luo, Huajun Huang

November 2004

**Proceedings of the 3rd international conference on Information security InfoSecu '04**

Publisher: ACM Press

Full text available: pdf(427.96 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

According to the types of the host media, digital watermarking may be classified mainly as image watermarking, video watermarking, audio watermarking, and text watermarking. The principle of the three watermarking research fields are similar in that they make use

of the redundant information of their host media and the characteristics of human video system or human audio system. Unfortunately, text has no redundant information. Text watermarking techniques are totally different from them. And te ...

**Keywords:** chinese character, component, digital watermarking, mathematical expression, robust, text watermarking

## 24 Technical session 3: audio processing: Real-time background music monitoring based



### on content-based retrieval

Yoshiharu Suga, Naoko Kosugi, Masashi Morimoto

October 2004 **Proceedings of the 12th annual ACM international conference on Multimedia MULTIMEDIA '04**

**Publisher:** ACM Press

Full text available: pdf(3.16 MB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

In this paper, we describe music monitoring in TV broadcasting based on content-based retrieval. A part of audio signals is sequentially extracted from TV broadcasting as a retrieval key, and a music DB that stores a great number of musical pieces is retrieved by this key based on content-based retrieval, and a musical piece is identified sequentially. In this way, we are able to carry out music monitoring. There are three necessary requirements important for realization of the music monitoring ...

**Keywords:** content-based retrieval, hashing, monitoring, music continuity, non-stationary noise, spectral peaks

## 25 A survey course on computer audio

Stephen V. Rice

June 2005 **Journal of Computing Sciences in Colleges**, Volume 20 Issue 6

**Publisher:** Consortium for Computing Sciences in Colleges

Full text available: pdf(127.98 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

A new one-semester course for graduate students introduces them to the field of computer audio from a computer science perspective. Students gain an understanding of sound, speech, and music and their digital representation and processing in computer software. Programming assignments provide hands-on experience in playing, recording, mixing, synthesizing, and analyzing audio. Class lectures present algorithms and techniques for compression, watermarking, synthesis, sonification, pitch and beat d ...

## 26 Posters: Copyright protection on the web: a hybrid digital video watermarking scheme



Pat Pik-Wah Chan, Michael R. Lyu, Roland T. Chin

May 2004 **Proceedings of the 13th international World Wide Web conference on Alternate track papers & posters WWW Alt. '04**

**Publisher:** ACM Press

Full text available: pdf(169.45 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Video is one of the most popular data shared in the Web, and the protection of video copyright is of vast interest. In this paper, we present a comprehensive approach for protecting and managing video copyrights in the Internet with watermarking techniques. We propose a novel hybrid digital video watermarking scheme with scrambled watermarks and error correction codes. The effectiveness of this scheme is verified through a series of experiments, and the robustness of our approach is demonstrated ...

**Keywords:** digital watermarking, hybrid, scene change, video

## 27 Digital multimedia book: From digital audiobook to secure digital multimedia-book



Lavinia Egidi, Marco Furini

July 2006 **Computers in Entertainment (CIE)**, Volume 4 Issue 3

**Publisher:** ACM Press

Full text available: pdf(364.18 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Portable devices and wireless connections are creating a new scenario in which digital information is entering our lives in a massive way. In this article we consider MP3 audiobook applications and propose an approach to completely restyle the applications to the current mobile and multimedia scenario. Our mechanism introduces multimedia

contents (images and text) into the audiobook application and synchronizes them with the MP3 audio stream. Multimedia contents are protected by a security system ...

**Keywords:** multimedia applications, multimedia communications, multimedia over wireless, music distribution

28


### Robust mesh watermarking

Emil Praun, Hugues Hoppe, Adam Finkelstein

July 1999

**Proceedings of the 26th annual conference on Computer graphics and interactive techniques SIGGRAPH '99**

**Publisher:** ACM Press/Addison-Wesley Publishing Co.

Full text available:  [pdf\(2.08 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** copyright protection, steganography

29

### Multimedia and Visualization (MV): A robust watermarking system based on SVD compression

Maria Calagna, Huiping Guo, Luigi V. Mancini, Sushil Jajodia

April 2006

**Proceedings of the 2006 ACM symposium on Applied computing SAC '06**

**Publisher:** ACM Press

Full text available:  [pdf\(871.94 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Digital watermarking can be used to protect the intellectual property for multimedia data. In this paper, we introduce an image watermarking scheme based on the SVD (*Singular Value Decomposition*) compression. In particular, we divide the cover image into blocks and apply the SVD to each block; the watermark is embedded in all the non-zero singular values according to the local features of the cover image so as to balance embedding capacity with distortion. The watermarking system we propose ...

**Keywords:** digital watermarking, image compression, singular value decomposition

30


### Audio watermarking techniques for the National Gallery of the Spoken Word

J. R. Deller, Aparna Gurijala, Michael S. Seadle

January 2001

**Proceedings of the 1st ACM/IEEE-CS joint conference on Digital libraries JCDL '01**

**Publisher:** ACM Press

Full text available:  [pdf\(173.80 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

This is one of two companion papers describing technical challenges faced in the development of the National Gallery of the Spoken Word (NGSW). The present paper describes watermarking technologies for intellectual property protection. Following an introduction to data watermarking, the paper focuses on a new algorithm called \textit{transform encryption coding} (TEC) and its application to watermarking the NGSW archives. TEC has a number of flexible features that make it amenable to ...

31

### Opportunities for watermarking standards

Fred Mintzer, Gordon W. Braudaway, Alan E. Bell

July 1998

**Communications of the ACM**, Volume 41 Issue 7

**Publisher:** ACM Press

Full text available:  [pdf\(672.37 KB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#), [review](#)

32

### Digital rights management and watermarking: An attack-localizing watermarking scheme for natural language documents

Gaurav Gupta, Josef Pieprzyk, Hua Xiong Wang

March 2006

**Proceedings of the 2006 ACM Symposium on Information, computer and communications security ASIACCS '06**

**Publisher:** ACM Press

Full text available:  [pdf\(390.28 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We present a text watermarking scheme that embeds a bitstream watermark  $W_i$  in a text

document  $P$  preserving the meaning, context, and flow of the document. The document is viewed as a set of paragraphs, each paragraph being a set of sentences. The sequence of paragraphs and sentences used to embed watermark bits is permuted using a secret key. Then, English language sentence transformations are used to modify sentence lengths, thus embedding watermarking bits in the Least ...

**Keywords:** copyright, permutation, watermarking

33 Session 7: content watermarking: Multimedia content screening using a dual watermarking and fingerprinting system



Darko Kirovski, Henrique Malvar, Yacov Yacobi

December 2002 **Proceedings of the tenth ACM international conference on Multimedia MULTIMEDIA '02**

Publisher: ACM Press

Full text available: pdf(262.42 KB)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

We present a new dual watermarking and fingerprinting system, where initially all copies of a protected object are identically watermarked using a secret key, but individual detection keys are distinct. By knowing a detection key, an adversary cannot recreate the original content from the watermarked content. However, knowledge of any one detection key is sufficient for modifying the object so that a detector using that key would fail to detect the marks. Detectors using other detection keys would ...

34 Special issue on independent components analysis: ICA for watermarking digital images

Stéphane Bounkong, Borémi Toch, David Saad, David Lowe

December 2003 **The Journal of Machine Learning Research**, Volume 4

Publisher: MIT Press

Full text available: pdf(554.76 KB)

Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

We present a domain-independent ICA-based approach to watermarking. This approach can be used on images, music or video to embed either a robust or fragile watermark. In the case of robust watermarking, the method shows high information rate and robustness against malicious and non-malicious attacks, while keeping a low induced distortion. The fragile watermarking scheme, on the other hand, shows high sensitivity to tampering attempts while keeping the requirement for high information rate and low ...

35 Robust FPGA intellectual property protection through multiple small watermarks



John Lach, William H. Mangione-Smith, Miodrag Potkonjak

June 1999 **Proceedings of the 36th ACM/IEEE conference on Design automation DAC '99**

Publisher: ACM Press

Full text available: pdf(119.08 KB)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** field programmable gate array (FPGA), intellectual property protection, watermarking

36 Watermarking relational data: framework, algorithms and analysis

Rakesh Agrawal, Peter J. Haas, Jerry Kiernan

August 2003 **The VLDB Journal — The International Journal on Very Large Data Bases**, Volume 12 Issue 2

Publisher: Springer-Verlag New York, Inc.

Full text available: pdf(223.17 KB)

Additional Information: [full citation](#), [abstract](#), [citations](#), [index terms](#)

**Abstract.** We enunciate the need for watermarking database relations to deter data piracy, identify the characteristics of relational data that pose unique challenges for watermarking, and delineate desirable properties of a watermarking system for relational data. We then present an effective watermarking technique geared for relational data. This technique ensures that some bit positions of some of the attributes of some of the tuples contain specific values. The specific bit locations and value ...

**Keywords:** Database, Information hiding, Steganography, Watermarking

37 Robust Audio Watermarking in Wavelet Domain Using Pseudorandom Sequences

Chin-Su Ko, Ki-Young Kim, Rim-Wo Hwang, YoungSeop Kim, Sang-Bum Rhee

July 2005

**Proceedings of the Fourth Annual ACIS International Conference on Computer and Information Science (ICIS'05) - Volume 00 ICIS '05**

Publisher: IEEE Computer Society

Full text available:

[Publisher Site](#)Additional Information: [full citation](#), [abstract](#), [index terms](#)

In this paper we proposed digital watermarking algorithms for high quality audio to improve robustness of embedded watermark by adding Spread spectrum. The watermark is embedded in each audio frame by adding a perceptually-shaped pseudo-random sequence. The proposed method realized digital audio watermarking technique that audience cannot perceive as a noise by inserting the watermark with using the Psychoacoustic Model.

38 Watermarking algorithms: Wavelet-based blind watermarking of 3D models

F. Uccheddu, M. Corsini, M. Barni

September 2004

**Proceedings of the 2004 workshop on Multimedia and security MM&Sec '04**

Publisher: ACM Press

Full text available:

[pdf\(462.47 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

Watermarking of 3D meshes has received a limited attention due to the difficulties encountered in extending the algorithms developed for 1D (audio) and 2D (images and video) signals to topological complex objects such as meshes. Other difficulties arise from the wide variety of attacks and manipulations 3D watermarks should be robust to. For this reason, most of the 3D watermarking algorithms proposed so far adopt a non-blind detection. In this paper we present a new blind watermarking algorithm ...

**Keywords:** 3D watermarking, 3D wavelets, blind detection, copyright protection, mesh watermarking

39 Watermarking techniques for intellectual property protection

A. B. Kahng, J. Lach, W. H. Mangione-Smith, S. Mantik, I. L. Markov, M. Potkonjak, P. Tucker, H. Wang, G. Wolfe

May 1998

**Proceedings of the 35th annual conference on Design automation DAC '98**

Publisher: ACM Press

Full text available:

[pdf\(243.93 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Digital system designs are the product of valuable effort and know-how. Their embodiments, from software and HDL program down to device-level netlist and mask data, represent carefully guarded intellectual property (IP). Hence, design methodologies based on IP reuse require new mechanisms to protect the rights of IP producers and owners. This paper establishes principles of watermarking-based IP protection, where a watermark is a mechanism for identificatio ...

**Keywords:** intellectual property test, system-on-chip test, testing embedded core

40 Digital watermarking approaches II: Watermarking techniques using the Drawing Exchange Format (DXF) file

Hwan II Kang, Kab II Kim, Seung-Soo Han

October 2001

**Proceedings of the 2001 workshop on Multimedia and security: new challenges MM&Sec '01**

Publisher: ACM Press

Full text available:

[pdf\(294.19 KB\)](#)Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

This paper presents an algorithm of the watermark insertion and extraction on the vector image. Most parts of the vector image consist of the array of the coordinate values. The vector watermarking method by Sakamoto et al [1] uses the mask within which all the coordinate values of all the vertices are changed depending on the value of the watermark. The proposed algorithm is the change of the vector image file instead of the change of the coordinate values on the vector image. We use the Dra ...

**Keywords:** Drawing Exchange Format File (DXFF), vector image, watermarking